

IN THE CLAIMS

Please amend the claims as follows:

1.-43. (Canceled)

44. (Withdrawn, Currently Amended) A method comprising:

forming a masking structure over [[the]] a substrate of a semiconductor device including forming an amorphous carbon layer and a cap layer, wherein the cap layer includes non-oxide materials, and wherein the amorphous carbon layer is transparent in visible light range to improve a reading of alignment marks in the substrate in the visible light range.

45. (Withdrawn) The method of claim 44, wherein forming the cap layer includes forming the cap layer with a material selected from a group consisting of boron carbide, boron nitride, silicon carbide, silicon nitride, fluoride films, fluorine doped with oxide, fluorine doped with nitride, and fluorine doped with carbide.

46. (Withdrawn, Currently Amended) The method of claim 44, wherein the amorphous carbon layer is transparent to radiation having wavelengths between 400 nanometers and 700 nanometers has an absorption coefficient between about 0.15 and 0.001 at a wavelength of 633 nanometers.

47. (Withdrawn, Currently Amended) The method of claim 44, wherein the amorphous carbon layer is formed by deposition.

48. (Withdrawn) The method of claim 47, wherein the cap layer is in situ deposited together with the amorphous carbon layer.

49. (Withdrawn) The method of claim 48, wherein forming the masking structure further includes forming a photoresist layer.

50. (Currently Amended) A method comprising:

forming a device structure over [[the]] a substrate; and

forming a masking structure over the device structure, the masking structure including an amorphous carbon layer and a cap layer, the cap layer including a material selected from a group consisting of boron carbide, boron nitride, silicon carbide, silicon nitride, fluoride films, fluorine doped with oxide, fluorine doped with nitride, and fluorine doped with carbide, wherein the amorphous carbon layer is transparent in visible light range to improve a reading of alignment marks in the substrate in the visible light range.

51. (Original) The method of claim 50, wherein a material of the cap layer is in situ deposited over the amorphous carbon layer.

52. (Currently Amended) The method of claim 50, wherein the amorphous carbon layer is transparent in visible light range has a thickness of at least 4000 Angstroms to allow etching of the device structure without substantially affecting the reading of the alignment marks in the wavelengths between 400 nanometers and 700 nanometers.

53. (Currently Amended) A method comprising:

forming a device structure on a substrate;

forming an amorphous carbon layer over the device structure;

forming a non-oxide cap layer over the amorphous carbon layer;

patterning the non-oxide cap layer to produce a patterned non-oxide cap layer; and

using the patterned non-oxide cap layer as a mask to pattern the amorphous carbon layer, wherein the amorphous carbon layer is transparent in visible light range to improve a reading of alignment marks in the substrate in the visible light range.

54. (Original) The method of claim 53, wherein the cap layer includes one of boron carbide, boron nitride, silicon carbide, silicon nitride, fluoride films, fluorine doped with oxide, fluorine doped with nitride, and fluorine doped with carbide.

55. (Currently Amended) The method of claim 53, wherein the amorphous carbon layer has an absorption coefficient between about 0.15 and 0.001 at a wavelength of 633 nanometers.

56. (Currently Amended) The method of claim 53, wherein the amorphous carbon layer is formed by deposition.

57. (Original) The method of claim 56, wherein the cap layer is in situ deposited together with the amorphous carbon layer.

58. (Currently Amended) The method of claim 57, wherein forming [[an]] the amorphous carbon layer is performed by a chemical vapor deposition process.

59. (Currently Amended) A method comprising:

forming device structure having a gate structure on a substrate;

forming masking structure over the device structure, the masking structure includes an amorphous carbon layer and a cap layer, the cap layer including non-oxide materials, wherein the amorphous carbon layer is transparent in visible light range to improve a reading of alignment marks in the substrate in the visible light range;

patterning the masking structure to form a patterned masking structure;

etching the device structure using the patterned masking structure as a mask to form a portion of a memory cell; and

removing the patterned masking structure.

60. (Original) The method of claim 59, wherein patterning the masking structure includes:

using a patterned photoresist layer as a mask to pattern the cap layer to form a patterned cap layer; and

using at least one of the patterned cap layer and the patterned photoresist layer to pattern the amorphous carbon layer.

61. (Original) The method of claim 60, wherein patterning the cap layer is performed by oxygen plasma etch process.
62. (Original) The method of claim 59, wherein removing the patterned amorphous carbon is performed using an oxygen plasma process with one of CF₄ and H₂.
63. (Currently Amended) A method comprising:
placing a wafer in a chamber, the wafer including at least one die having a substrate and a device structure formed over the substrate;
forming an amorphous carbon layer over the device structure; and
forming a cap layer over the amorphous carbon layer, the cap layer including a material selected from a group consisting of boron carbide, boron nitride, silicon carbide, silicon nitride, fluoride films, fluorine doped with oxide, fluorine doped with nitride, and fluorine doped with carbide, wherein the amorphous carbon layer is transparent in visible light range to improve a reading of alignment marks in the substrate in the visible light range.
64. (Original) The method of claim 63, wherein a material of the cap layer is in situ deposited together with the amorphous carbon layer.
65. (Currently Amended) The method of claim 63, wherein the amorphous carbon layer is transparent in visible light range has an absorption coefficient between about 0.15 and 0.001 at a wavelength of 633 nanometers.
66. (Original) The method of claim 63, wherein the chamber is a plasma enhanced vapor chemical deposition chamber.
67. (New) A method comprising:
forming a device structure over a substrate; and
forming an amorphous carbon layer over the device structure; and

forming a cap layer over the amorphous carbon layer, the cap layer including boron carbide.

68. (New) The method of claim 67, wherein the amorphous carbon layer is transparent in wavelengths between 400 nanometers and 700 nanometers to improve a reading of alignment marks in the substrate in the wavelengths between 400 nanometers and 700 nanometers.

69. (New) The method of claim 68, wherein the amorphous carbon layer has a thickness of at least 4000 Angstroms to allow etching of the device structure without substantially affecting the reading of the alignment marks in the wavelengths between 400 nanometers and 700 nanometers.

70. (New) The method of claim 69, wherein the device structure has thickness of at least 40000 Angstroms.

71. (New) A method comprising:

forming a device structure over a substrate; and

forming an amorphous carbon layer over the device structure; and

forming a cap layer over the amorphous carbon layer, the cap layer including boron nitride.

72. (New) The method of claim 71, wherein the amorphous carbon layer is transparent in wavelengths between 400 nanometers and 700 nanometers to improve a reading of alignment marks in the substrate in the wavelengths between 400 nanometers and 700 nanometers.

73. (New) The method of claim 72, wherein the amorphous carbon layer has a thickness of at least 4000 Angstroms to allow etching of the device structure without substantially affecting the reading of the alignment marks in the wavelengths between 400 nanometers and 700 nanometers.

74. (New) A method comprising:

forming a device structure over a substrate; and

forming an amorphous carbon layer over the device structure; and

forming a fluoride film over the amorphous carbon layer.

75. (New) The method of claim 74, wherein the fluorine film includes CaF_x , where x represents a number of atoms in a stable compound.

76. (New) The method of claim 74, wherein the fluorine film includes MgF_x , where x represents a number of atoms in a stable compound.

77. (New) The method of claim 74, wherein the amorphous carbon layer is transparent in wavelengths between 400 nanometers and 700 nanometers to improve a reading of alignment marks in the substrate in the wavelengths between 400 nanometers and 700 nanometers.

78. (New) The method of claim 75, wherein the amorphous carbon layer has a thickness of at least 4000 Angstroms to allow etching of the device structure without substantially affecting the reading of the alignment marks in the wavelengths between 400 nanometers and 700 nanometers.

79. (New) A method comprising:

forming a device structure over a substrate; and

forming an amorphous carbon layer over the device structure; and

forming a cap layer over the amorphous carbon layer, the cap layer including fluorine doped with nitride.

80. (New) The method of claim 79, wherein the amorphous carbon layer is transparent in wavelengths between 400 nanometers and 700 nanometers to improve a reading of alignment marks in the substrate in the wavelengths between 400 nanometers and 700 nanometers.

Title: MASKING STRUCTURE HAVING MULTIPLE LAYERS INCLUDING AN AMORPHOUS CARBON LAYER

81. (New) The method of claim 80, wherein the amorphous carbon layer has a thickness of at least 4000 Angstroms to allow etching of the device structure without substantially affecting the reading of the alignment marks in the wavelengths between 400 nanometers and 700 nanometers.

82. (New) A method comprising:
forming a device structure over a substrate; and
forming an amorphous carbon layer over the device structure; and
forming a cap layer over the amorphous carbon layer, the cap layer including fluorine doped with carbide.

83. (New) The method of claim 82, wherein the amorphous carbon layer is transparent in wavelengths between 400 nanometers and 700 nanometers to improve a reading of alignment marks in the substrate in the wavelengths between 400 nanometers and 700 nanometers.

84. (New) The method of claim 83, wherein the amorphous carbon layer has a thickness of at least 4000 Angstroms to allow etching of the device structure without substantially affecting the reading of the alignment marks in the wavelengths between 400 nanometers and 700 nanometers.